WHAT IS CLAIMED IS:

1. In combination with a locked gear train (12) having two helical gears (36A, 36B) carried on a first shaft (46) and two pinions (32A, 32B) carried on a second shaft (42), with a first pinion (32A) meshed with a first gear (36A) and a second pinion (32B) meshed with a second pinion (36B), an arrangement for testing a power transmission component comprising,

a support arrangement (30A, 30B) by which the first and second gears (36A, 36B) and the first shaft (46) are free to move axially with respect to the first and second pinion gears (32A, 32B) and the second shaft (42)

a thrust bearing (50) coupled to a first end of the first shaft (46), and

a prime mover (52) coupled to a second end of the first shaft (46) which applies a positive torque to the second end of said first shaft, whereby

a force (F) applied axially to the thrust bearing (50) causes axial displacement (A) of the first and second gears (36A, 36B) with respect to the first and second pinion gears (32A, 32B) while establishing a negative torque in the locked gear train (12) which opposes the positive torque to produce a power level in the locked gear train greater than that produced solely by the prime mover.

2. The arrangement of claim 1 wherein,

a spline arrangement (54) couples the prime mover (52) with the second end of the first shaft (46).

3. The arrangement of claim 2 further comprising,

a measurement device by which torque applied to the thrust bearing can be determined.

4. The arrangement of claim 3 wherein the measurement device includes

a load measuring device installed in an axial force path of the first shaft (46) for measuring force F applied to the thrust bearing (50), and the torque is determined from the measurement of F by the relationship,

$$-T = \frac{F\,r}{\tan \Phi}, \text{ where}$$

Φ	=	helix angle (radian) of main and pinion gears,
r	=	radius of the main gear (ft.)
T	=	torque (ft. lbs.)
F	=	axial force (lbs.)

5. The arrangement of claim 3 wherein the measurement device includes

a displacement indicator (64) arranged and designed to measure a displacement distance A on the first shaft and wherein,

the torque is determined from the measurement of A by the relationship,

$$-T = \frac{A\,k \tan \Phi}{r}$$

where

T	=	torque (ft. lbs.)
A	=	axial travel (ft.)
Φ	=	helix angle (radian)
r	=	radius of the main gear (ft.)
k	=	spring constant (ft. lbs./radian)

6. The combination of claim 1 wherein,

the two helical gears (36A, 36B) are of opposite hand and the two pinions are of opposite hand.

7. A method for testing a power transmission component comprising the steps of

installing the component in a locked gear train (12) having two helical gears (36A, 36B) carried on a first shaft (46) and two pinions (32A, 32B) carried on a second shaft (42), with a first pinion (32A) meshed with a first gear (36A) and a second pinion (32B) meshed with a second gear (36B), the locked gear train having a support arrangement (30A, 30B) by

which the first and second gears (36A, 36B) and the first shaft (46) are free to move axially with respect to the first and second pinions (32A, 32B) and the second shaft (42),

coupling a thrust bearing (50) to a first end of the first shaft,

coupling a prime mover (52) to a second end of the first shaft,

applying an axial force to the thrust bearing (50) to cause axial displacement (A) of the first and second gears (36A, 36B) with respect to the first and second pinions (32A, 32B), which through helix angles of the gears causes an angular deflection in opposed directions in the gears thereby establishing a torque in the locked gear train (12) which upon rotation at a test speed produces a power level in the locked gear train greater than that produced solely by the prime mover.

8. The method of claim 7 whereby

the prime mover is coupled to the second end of the first shaft by a spline arrangement.

9. The method of claim 8 further comprising the steps of

installing a load measuring device in an axial force path of the first shaft (46),

applying an axial force to the thrust bearing, and determining torque to the locked gear train from the measurement of force F from the load measuring device by the relationship

$$-T = \frac{F\,r}{\tan \Phi}$$

where

Φ	=	helix angle (radian) of main and pinion gears
r	=	radius of the main gear (ft.)
T	=	Torque (ft. lbs.)
F	=	axial force (lbs.)

10. The method of claim 8 further comprising the steps of

applying an axial force (F) to the thrust bearing,

measuring axial displacement (A) of the first shaft (46) in response to said axial force (F), and

determining torque from the relationship,

$$-T = \frac{A\,k\tan\Phi}{r}$$

where,

T	=	torque (ft. lbs.)
A	=	axial travel (ft.)
Φ	=	helix angle (radian)
r	=	radius of the main gear (ft.)
k	=	spring constant (ft. lbs./radian)

11. The method of claim 7 wherein,

the two helical gears (36A, 36B) are of opposite hand and the two helical pinions are of opposite hand.